

VII. Abstract

5 The invention relates to improved multi-axis joysticks and associated multi-axis
optical displacement measurement means. The displacement measuring means may include
one or more light emitters and one or more light detectors, preferably mounted in a planar
hexagonal array. The relative position of an adjacent movable reflector assembly can be
measured in six degrees of freedom by variations in detected light amplitude. Various
ergonomic configurations of six axis joystick embodiments which may be facilitated by the
10 compact design of the transducer means are disclosed. Means for dynamically adjusting
coordinate transformations for construction machinery control are also disclosed.